

BELMONT MILL, TRAM TOWERS 1 AND 2
(Nevada Belmont Mill)
Humboldt-Toiyabe National Forest
Approximately 7 miles south of U.S. Route 50 on USDA Forest
Service Road No. 623
Ely vicinity
White Pine County
Nevada

HAER NV-46-C
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
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Location: Approximately 7 miles south of U.S. Route 50 on USDA Forest Service Road No. 623, Ely vicinity, White Pine County, Nevada.
U.S. Geological Survey, Seligman Canyon, Nevada, 7.5 Quadrangle (1992), Township 16 North, Range 57 East, Section 1.
UTM Zone 11, Easting 2060379.54, Northing 14266262.12 (center of Tower 1); Easting 2060930.01, Northing 14266987.95 (center of Tower 2) (NAD 83).

Significance: The Tonopah Belmont Development Company (TBDC) was one of the most important companies created during Nevada's early twentieth-century mining boom. As ore deposits in its central Nevada mines were depleted, the company sought new claims to resurrect its fortunes. In 1926 TBDC built the Belmont Mill near Hamilton to process lead and silver ore from its recently acquired claims in the White Pine mining district of eastern Nevada. The small pilot mill employed the most recent advances in table concentration and flotation mineral processing techniques, and the company erected numerous other buildings and structures, including an aerial tramway, to support the mining and milling work. The tramway formed the crucial connection between the mine and the mill and which, despite the initial high cost of construction, was intended to increase efficiency at the site to the point where the low-grade lead ore could be mined, reduced, and shipped at a profit. The entire tramway is intact, including the top and bottom terminals, the towers and the cables; only the ore buckets are missing. This is rare in the American west, as the expensive tramways were reused wherever possible and were otherwise susceptible to severe weather conditions.

Although largely abandoned by TBDC after a few years, later owners used the mill and sometimes the tramway for smaller operations. Today, although most of the equipment has been removed, the Belmont Mill site (and very unusually, its tramway) is one of the only intact early twentieth-century mill complexes in eastern Nevada. As such, it is a tangible reminder of the decline and failure of a once-powerful company and, thereby, of the boom and bust cycle so common in the mining industry. The subsequent modification and reuse of the mill for small-scale operations typifies the ceaseless hum of optimism that sustains the mining industry.

Description: The tramway comprises a top terminal at the mine and a bottom terminal at the mill, with six towers supporting the ropes and ore buckets. Because only the first two towers are under the purview of the Forest Service, only those are described here. Tower 1 is located about 730' from the mill on the hillside to the south. Tower 2 is located about 108' south of Tower 1.

Historically, four basic types of tramway towers were used: the pyramid tower (four upright legs that joined at the structure's crest), the through tower (an A-shaped frame that allowed bucket to pass through the structure), the braced hill tower (a through tower with exaggerated diagonal braces to tie it to steep terrain), and the composite tower (a truncated pyramid with a smaller frame supporting a cross-member).¹ Regardless of type,

Towers... required stout cross-members to support the wire ropes at a distance that permitted the buckets to swing in the wind and not strike the towers... Bleichert systems [like that at the Belmont mill]... required a stout cross-member at the tower top to support the stationary track cable, and a second cross-member three to seven feet below to accommodate the moving traction rope. The second cross-member almost always featured either idler wheels or a broad steel roller.²

Tower 1 of the Belmont Mill tramway does not fit neatly into any of the types given above. It comprises a rectangular timber framework with diagonal cross-bracing, joined with threaded bolts. The long dimension of the framework runs north to south, parallel with the cables. On the top of the framework, cross pieces at either end support the track cable, which runs over shallow steel guides. The framework has shoulders on its east and west sides a few feet above grade; these are equipped with steel pulley wheels at both ends (16" outside diameter) over which the traction cable runs. Bent metal rods at the approach ends may have served to control the swing of the ore buckets as they passed by the tower.

Tower 2 is a composite tower with a truncated pyramidal timber framework supporting a T-shaped upper section. The track rope is supported by shallow steel guides on either side of the top cross-piece. The east and west shoulders of the truncated pyramid support single steel pulley wheels with bent metal guide rods on the approach side.

The tramway operated as follows: as a loaded ore bucket entered through the east door in the south wall of the bottom terminal (Level 1 of the mill), a worker would uncouple it from the traction rope and roll the bucket along a hanging rail, stopping it at the north end of the room and directing the ore into one of the three ore bins on Level 2, probably depending on the grade of ore. After emptying the bucket, he would roll it to the other side of the room where it was reconnected to the traction rope for return to the upper terminal through the west door. A similar process occurred at the top terminal, where incoming empty ore buckets were uncoupled from the traction rope, filled with ore from the mine, recoupled to the track and traction ropes, and sent to the bottom terminal.

¹ Eric Twitty, Riches to Rust: a guide to Mining in the Old West (Montrose, CO: Western Reflections Publishing Co., 2005), 132

² Twitty, Riches to Rust, 133

Each of the stationary track ropes (one for the descending ore buckets on the east side of the towers and one for the ascending buckets on the west) terminates inside the mill building at a large clamp that is attached by a chain to a rock-filled counterweight bin suspended beneath the terminal. The continuous loop of traction rope passes around large, horizontally oriented sheave wheels in the top and bottom terminals (6'-4" diameter). These sheaves carry tremendous loads and are mounted to heavy, and heavily reinforced, timber frames. The bottom sheave can be moved north to south along rails to adjust the tension on the traction rope. To anchor this wheel, two anchor cables or backstays extend from the terminal to the north of the building; these are about 250' long and are anchored to the ground in either bedrock or concrete. The sheave is connected by double lengths of cable to a third counterweight suspended beneath the tram terminal. There is no braking device at bottom end of the tramway and it appears that all braking functions were performed at the upper terminal.³

History: See the Narrative Overview in HAER No. NV-46 for a broad contextual history.

The first aerial tramway was developed by Andrew Hallidie in the 1860s to address mining transportation problems posed by high mountains, difficult terrain, and winter snows in the western United States. Hallidie's design comprised a continuous single loop of wire rope that passed around large sheave wheels at the top and bottom of the tramway, with ore buckets suspended from the rope. The system was designed to run by gravity: the loaded buckets would gently descend to the mill and pull the empty buckets back to the mine.

The use of a single rope to both carry and move the buckets presented a number of problems, and two German engineers, Theodore Otto and Adolph Bleichert, invented a new system that was first used in Europe in 1874, the Bleichert double rope tramway. This system employed a track rope spanning from tower to tower that was fixed in place and over which the ore buckets coasted on hangers with guide wheels. A moving traction, or haul, rope was attached to the bucket's hanger by a mechanical clamp, or grip, and it effectively pulled the bucket along the fixed track rope.

The grip fastening the buckets to the traction rope was releasable, permitting workers to manually push the buckets around the interior of the terminal on hanging rails and fill them at leisure without spillage...

Due to superior performance, the popularity of Bleichert systems eclipsed the less expensive Hallidie tramways by the 1890s, when the use of tramways in the West surged.⁴

³ Lift Services Inc., "Inspection Report: Belmont Mill Site, Humboldt-Toiyabe National Forest," September 28, 2010.

⁴ Twitty, Riches to Rust, 129.

The tramway at the Belmont Mill is a Bleichert-type double rope system and it was originally constructed at the Chollar mine in Virginia City, Nevada, probably in the late nineteenth century. The Chollar was located in 1859 and became the fifth most productive mine on the Comstock, producing as much as \$17 million in silver ore. In 1887 the Nevada Mill was built near the mine to process low grade ore and the tram, “said to be one of the largest and best constructed tramways in the state,” may have been built at that time.⁵

In 1926 the Chollar tramway was dismantled, including the top and bottom tram terminals, the ore buckets, and the machinery, and re-erected at the Belmont site. A number of the timbers bear traces of red and white paint, probably remaining from the Chollar days, and some are also numbered, no doubt to assist in assembly (either originally in Virginia City or later at Belmont). According to the local newspaper, “The tramway will be equipped with 30 500-pound ore buckets, and will be operated primarily by gravity, the 15 loaded buckets furnishing the gravity to pull back the empties.”⁶ By about 1970 only six or seven buckets remained on the ropes; none remain today. However, two of the rectangular metal buckets are visible in a photograph that may date to ca. 1940 (see Figure 6 in HAER No. NV-46).

Today, aside from the missing ore buckets, the entire length of the tramway between the lower and upper terminals, including all six towers and both the track and traction cables, is intact.

Sources: See HAER No. NV-46.

Historian: Anne Oliver, Principal, Oliver Conservation Group. Fieldwork for the project was conducted in the fall of 2010. Project documentation was accepted by HABS/HAER in 2011.

Project Information: See HAER No. NV-46 for complete details. In summary, this project was completed under a contract between the Humboldt-Toiyabe National Forest and a consulting team under the direction of ajc architects (Salt Lake City, Utah), in consultation with the Nevada State Historic Preservation Office. The project historian was Anne Oliver, historic preservation consultant with Oliver Conservation Group. Matt Wallace, intern architect with ajc architects, was responsible for the architectural measured drawings and completed all fieldwork and final drawings with the assistance of Oliver Smith Callis, draftsman. The photography was produced by Steve Tregeagle Photography under the direction of Steve Tregeagle and with the assistance of Heath Brown.

⁵ After years of decline and, it would appear, dismantling, the Chollar was closed in the 1940s. See www.nevada-landmarks.com/st/shl209.htm (accessed December 8, 2010).

⁶ Ely Daily Times, June 19, 1926.